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steadily to the eastward along and north of Barrow Straits, and doubtless arrived in small parties throughout the fourteenth, fifteenth, and sixteenth centuries. As new relays arrived they may be supposed to have separated in parties to the north and south; the former wandering whither we know not, the others descending by the shores of Smith Sound. How far these migratory bands, having thus reached their easterly limit, may have wandered northward towards the Pole, is a matter still to be investigated; and this, together with the modes of life of these northernmost tribes of men, analogous to those of the ancient races of Europe, was one of the numerous scientific points on which light may be thrown by the proposed Polar expedition.

The second Paper was entitled—

2.—*On the proposed Expedition to the North Pole.* A Letter addressed to SIR RODERICK I. MURCHISON, K.C.B. By DR. AUGUSTUS PETERMANN, Hon. Corr. Mem. R.G.S., Gotha.

SIR—I very much rejoice to see that Arctic research is to be renewed by British explorers, and that the subject brought forward by Captain Sherard Osborn has been taken up by yourself and the Royal Geographical Society. Now that most of the mysteries of the interior of Africa and Australia have come to light, the greatest geographical problems that remain to be solved are the geography of the Central Polar Regions, and the attainment of the Poles themselves; and it is my conviction that the English nation, before all others, is destined, or at least is in the best position, to achieve this, the great crowning triumph of the discoveries on our planet.

The remarks I beg to submit to you, and to the attention of British geographers, on the paper of Captain Osborn, and the discussion thereon, as contained in the report of your proceedings (Slip of Meeting of the Royal Geographical Society of 23rd January, 1865, published 6th February) received by me this day, are for the purpose of advocating the selection of the Spitzbergen route instead of Smith Sound. Having recommended this direction for Arctic research for the last 13 years, I refer to some of my former publications on Arctic geography generally,* and confine myself on this

* 1. The Arctic Expeditions. ('Athenæum,' 17th Jan., 1852, pp. 82, 83.)

2. Plan of Search proposed by Mr. Petermann: Letter to Admiral Sir Francis Beaufort, 23 Jan., 1852. (Parliamentary Papers, 'Arctic Expeditions,' 1852, pp. 142—147.)

3. On the Passage into the Arctic Basin, a communication to Capt. Mangles, R.N., Feb., 1852. (Capt. Mangles' 'Arctic Searching Expeditions, 1850-1852,' pp. 72-75.)

4. Notes on the Distribution of Animals available as Food in the Arctic Regions. ('Journal of the Royal Geographical Society,' vol. xxii. pp. 118-127.)

occasion to a brief recapitulation of some of the principal facts bearing on the present subject, premising that you yourself, Sir, in your Addresses to the Royal Geographical Society in 1852 and 1853,* acknowledged the "well registered facts" on which my views are based, and the importance of the exploration of the Spitzbergen Seas on geographical grounds, as well as for the interests of the British whale-fisheries.

1. The seas east and west of Spitzbergen offer the shortest route to the North Pole from Great Britain; the distance from London to that point by the western side of Spitzbergen being about 2400 nautical miles, and by the eastern side 2500. The distance to the North Pole by way of Smith Sound is 4000 miles, 2400 miles from London in that direction reaching only as far as the middle of Davis Strait.

2. The Spitzbergen seas form by far the widest, indeed, the only oceanic opening into the chief, the Central Polar Regions, and to the North Pole, and offer, for that reason alone, the easiest and most practicable and navigable of all openings for vessels into the Polar Regions.

3. The Spitzbergen seas are more free of ice than any other part of the Arctic or Antarctic Seas in the same latitude, the parallel of 80° N. being every year accessible, even to small craft, with certainty and safety. "Yachtsmen," Captain Osborn correctly observes, "go for pleasure, and poor Norwegian fishermen sail in almost open boats" to that high latitude. In Smith Sound the combined efforts of British and American expeditions have only reached to 78° 45' N. lat. in vessels, and to about 81° in sledges. Despite these most determined efforts, very little progress has been made in that direction since the days of Baffin, 249 years ago,

5. The Search for Franklin (pamphlet). Illustrated by a Polar Chart. London: Longmans. May, 1852.

6. Polar Chart, showing the chief Physical Features of the Arctic Regions, &c. (In Dr. P. C. Sutherland's 'Account of Capt. Penny's Expedition.' London, 1852).

7. Sir John Franklin; the Navigableness of the Spitzbergen Sea, and the Whale Fisheries in the Arctic Regions, with Map. ('Journal of the Royal Geographical Society,' vol. xxiii. pp. 129-136.)

8. On the Whale Fisheries in the Arctic Regions. ('Times,' 8 Nov., 1852.)

9. On the Whale Fisheries in the Arctic Regions. ('Times,' 11 Nov., 1852.)

10. Baffin Bay and the Polar Basin. ('Athenæum,' 11 Dec., 1852.)

11. Letter addressed to the Lords Commissioners of the Admiralty, 29 Nov., 1852. (Parliamentary Papers, 'Arctic Expeditions,' ordered by the House of Commons to be printed, Dec. 1852, pp. 78-85.)

12. On the Geography of the Arctic Regions. ('Athenæum,' 22 Oct., 1853.)

13. The Arctic Regions. ('Athenæum,' 19 Nov., 1853.)

14. Arctic Discovery and the Whale Fisheries. ('Times,' 9 Dec., 1853.)

15. On the Geography of the Arctic Regions. ('Athenæum,' 24 Nov., 1855.)

* 'Journal of the Royal Geographical Society,' vol. xxii. pp. lxxix seq., and vol. xxiii. pp. lxxxi seq.

who, in 1616, attained about 78° n. lat., nearly as far as the recent expeditions of Inglefield, Kane, and Hayes, though the two last expeditions went with the avowed purpose to reach the North Pole.

4. From Spitzbergen to the northward the sea is encumbered more or less with drift-ice, which offers just as much or as little impediment to navigation as other seas of the like nature, for example, Baffin Bay. From the concurrent testimony of the most recent as well as former navigators, much less ice is met with in the Spitzbergen seas during the spring and autumn than in the height of summer, and at certain times the seas are entirely free of ice.

5. A sea of the extent and depth as the one north of Spitzbergen, (Sir E. Parry found no bottom with 500 fathoms) swept by mighty currents, and exposed to the swell of the whole Atlantic, will never, not even in winter, be entirely frozen over, or covered with solid ice fit to travel on with sledges, but will be more free of ice, and more open, than the ice-bound, choked-up labyrinth of the chief scene of the Franklin search, 20 degrees south of the Pole. On the supposition that Captain Phipps's main or heavy ice extended to the North Pole, Sir Edward Parry's expedition in 1827 was founded. Instead, however, of finding any solid ice upon which to reach the North Pole in sledge-boats, he found no heavy ice at all, but only loose drift-ice, half the thickness of that at Melville Island; so that he came to the conclusion "a ship might have sailed to the latitude of 82° almost without touching a piece of ice."*

6. From Sir Edward Parry's furthest point in $82^{\circ} 45'$ n. lat., a navigable sea was extending far away to the north, as reported by the old Dutch and English skippers, who vowed that they had sailed as far north as 88° , and beyond the Pole itself, and found a navigable sea. However much Captain Osborn may ascribe these reports to "dreamy Amsterdam and to the strong Dutch beer," the general correctness of the old Dutch navigators, and the non-discovery of any land, speak in their favour, as it is well known that navigators and maritime explorers are in general much more predisposed to discover land than to have to report upon the continuation of the sea. Many coasts, islands, and large countries in every part of the globe, that were reported to have been seen and discovered, have had to be erased from the map.

But rejecting these old accounts altogether, Sir E. Parry's position in $82^{\circ} 45'$ n. lat., in a perfectly navigable sea, remains an unassailable fact; from which point to the North Pole, a distance of only 435 miles, cannot be more difficult to navigate than a like distance in Baffin Bay, or in any other polar sea of similar extent.

* Parry's 'Narrative,' p. 148.

7. All facts connected with the geography of the Arctic Regions, whether as regards the extent of actual exploration or the observations on the currents, climate, drift-ice, and drift-wood, lead to the conclusion that the regions under the Pole, and as far as Spitzbergen, consist of an expanse of sea and not land. But even if land should be found under the Pole, an expedition by way of Spitzbergen reaching it, could extend the exploration by means of sledges; whereas sledge-expeditions finding open water like that of Parry, or the repeated attempts of Wrangell and Anjou on the Siberian coast, would be at an end, and must inevitably fail and return.

From the total absence of drift-wood north of Smith Sound, I conclude that those inlets can have no connexion with the Polar Sea on the Asiatic side and off the continental coast of North America, and that a neck of land not far to the north of Cape Parry, as seen by Morton in 82° , turns those waters into a bay. The supposition of land stretching from Cape Parry as far as the North Pole is a mere speculation founded on nothing but the wish that such should be the case. It would be a matter of regret of the success of an expedition should be staked on such a speculation.

8. Sir Edward Parry's expedition as far as $82^{\circ} 45'$ n. lat. in the Spitzbergen Sea, the highest point yet reached by any well-authenticated expedition, only took six months from the river Thames and back, and only cost 9977*l.*

The foregoing points, as submitted to public notice more fully on former occasions, have not only not been controverted, but more and more corroborated by recent research and the testimony of British seamen. I only refer to the communication of Dr. Henry Whitworth, of St. Agnes, Cornwall, surgeon of the *Truelove*, of Hull, who reached, in 1837, the latitude of $82^{\circ} 30'$ n., in 12° to 15° E. longitude. He says:—"I am satisfied that the probability of reaching the Pole by water is much greater than by land, for we had in $82\frac{1}{2}$ an open sea to the north-east quite free from ice, no apparent obstruction presented itself to our progress; we might have reached the Pole with the same ease and safety that we reached the latitude we then were in. A screw steamer properly constructed, well manned, and efficiently commanded, would prove the practicability of the attempt in a voyage of three months, and might, in addition to its main object, discover new fishing-grounds to the east of Spitzbergen for our whalers. The months should be April, May, and June. In July the navigation of the Arctic Ocean becomes dangerous from the dense fogs which prevail."*

* 'Athenaeum,' 3 Dec., 1853.

To these remarks on the Arctic Regions I beg to add a few arguments derived from *Antarctic* experience, which are highly instructive in their bearing on the proposed expedition to the North Pole.

Of the many hypocritical lands that were supposed to exist, the great *Terra Australis* was one of the most gigantic and absurd works of imagination; and it is to be hoped that the many fools' errands which resulted from the search for it will be a warning against any imaginary *Terra Polaris* north of Smith Sound or elsewhere. About 300 years ago that great *Terra Australis* was supposed to comprise all the regions round the South Pole as far north as the Straits of Magellan, reaching thence to near the Cape of Good Hope, and comprising the whole of Australia, New Guinea, and a large portion of the Pacific. Abel Tasman in 1642 cut off a good slice by discovering the southern coast of Australia; but up to the time of Cook, to within 90 years ago, a great Austral land, reaching from New Zealand to Bouvet Islands (south-west of the Cape of Good Hope), both being considered as promontories of the continent, was insisted on. Captain Cook went forth in its search, for "whether the unexplored part of the southern hemisphere be only an immense mass of water, or contain another continent, was a question which had long engaged the attention, not only of learned men, but of most of the maritime powers of Europe. To put an end to all diversity of opinion about a matter so curious and important, was his Majesty's principal motive in directing this voyage to be undertaken."* Cook dispelled the illusion of a great southern continent, and showed that if Antarctic land of any extent existed, it must be confined to the central space within the latitude of 60° s.

The idea of a great Antarctic continent was sought to be revived by Lieut. Wilkes, of the U.S. Exploring Expedition, who supposed and laid down on his chart an impenetrable ice-barrier with high mountains and his Antarctic continent behind, to the south, exactly where Sir James Clark Ross, coming from the opposite side, namely from the direction of the South Pole, sailed over and found no bottom with 600 fathoms!

Cook, by proving the non-existence of the monstrous *Terra Australis*, created another popular illusion and Antarctic bugbear by pronouncing the Polar Sea beyond his furthest point in $71^{\circ} 10'$ s. lat. totally impracticable for navigation and for any further research. "It was," he says, "indeed, *my* opinion, as well as the opinion of most on board, that this ice [in $71^{\circ} 10'$ s. lat.] extended quite

* Cook, 'Voyage towards the South Pole,' 1772-1775. London, 1777, 4to. Introduction, p. ix.

to the Pole, or perhaps joined to some land, to which it had been fixed from the earliest time;* and the risk one runs in exploring a coast in these unknown and icy seas is so very great, that I can be bold enough to say, that no man will ever venture further than I have done, and that the lands which may lie to the south will never be explored.”† These views of the great navigator damped the ardour for further research in the Antarctic Seas for 40 succeeding years, till in 1819 it was again resumed by the Russian Expedition under Bellingshausen, and quickly followed by Weddell, Biscoe, Kemp, Balleny, d’Urville, Wilkes, J. C. Ross, and Moore down to 1845. Sir James C. Ross penetrated to $78^{\circ} 10'$, 7 degrees, or 420 miles, further towards the Pole than Cook, even without the aid of steam.

What Cook thought of the ice and the navigableness of the Antarctic Ocean south of 71° corresponds with the popular prejudice as to the sea north of Spitzbergen. When he turned back from his furthest, near Southern Thule (in 60° s. lat.), he says that he was “tired of those high latitudes, where nothing was to be found but ice and thick fogs.”‡ But in the same region, and on nearly the same meridian, Weddell, with his two frail vessels of 65 and 160 tons, pushed no less than 850 nautical miles further towards the Pole than Cook; and what is more, found a sea entirely free of field-ice, with innumerable whales and birds, and delightful weather. He reached his furthest, $74^{\circ} 15'$ s. lat., $34^{\circ} 16' 45''$ w., on the 20th February, 1823; and although it blew a fresh breeze from s. by w., only three ice-islands were in sight from the deck, and one other from the mast-head; the sea was literally covered with birds of the blue petrel kind, the weather was mild and pleasant, and the atmosphere very clear. It is fortunate that James Weddell was not a dreamy Dutchman, but a master in the Royal British Navy, and that he did not relate his discoveries “over strong Dutch beer,” but published all his observations in a well-authenticated work.§

The fact is, that the most important feature of the formation and distribution of the Arctic as well as the Antarctic ice is not always kept in view in all its bearings and consequences; it is this,—that the ice formed on the coasts and in the ocean every winter, is towards the end of that season set in motion to lower latitudes, where it rapidly melts away. Vessels proceeding towards the Pole in the spring and summer—and hitherto only these seasons have been selected for Polar voyages—encounter those ice-streams generally in their furthest limits towards the Equator, in latitudes where

* Cook, ‘*Voyage*,’ vol. i. p. 268.

† *Ibid.*, vol. ii. p. 231.

‡ *Ibid.*, vol. ii. p. 223.

§ Weddell, ‘*A Voyage towards the South Pole*,’ 1822-24. London, 1825.

the ice is entirely absent in winter, and where little is found in the spring and autumn. This is the case in every Polar sea of any extent, and with a ready access and egress. In the southern hemisphere the greatest number of observations have been registered on the subject, because the great highways of the commerce and navigation of the world extend in that direction. Captain Maury has examined no less than 1843 logs of voyages south of 35° s. lat., with the view of putting together the data on the occurrence of ice.* Out of the 1843 voyages, 167 met with ice; and out of these, 39, or nearly one-fourth, occurred in December (corresponding to our June), none whatever in July (our January), 132 occurred during the Antarctic summer months of November, December, January, February, March (our May to October), and only 35, or about one-fifth, during the winter months. The same result has been arrived at by the numerous observations collected and discussed at the Flagstaff Observatory, Melbourne, during the years 1858-62, by the Director, Prof. G. Neumayer, and is thus expressed:—"In December and January (our June and July) the South Pacific is visited by innumerable icebergs between 50° and 55° s. latitude. Under the influence of the southerly and south-easterly gales, the fleet of ice commences to move at the end of August (our February) towards the north, and by the middle of December we find it carried along before westerly gales between the parallels of latitude 50° and 60° , and the greatest accumulation of ice occurs in November, December, January, and February (our May to August), on or near the parallel of 55° s. Ships sailing during these months on the parallel of 60° run therefore less risk."† So that the merchant fleets of the world now sail on the same parallel of 60° , from which the great Cook turned back.

All the ice, whether in the form of drifting icebergs or floes, of field-ice or barriers, forms a moveable band of 2° to 6° of latitude in width, beyond which the sea is more or less free of ice, and not in a progressive ratio filled up with it, as popularly supposed. Vessels pushing through this belt or barrier will find a navigable sea in the highest latitudes, and no doubt to the Pole itself, if an extensive sea reaches that point.

In like manner, vessels penetrating through the floating ice at or near Spitzbergen will find a clear and navigable sea before them as far as the North Pole. It is well known that in certain seasons of the year, and sometimes all the year round, the northern portion of

* Maury, 'Sailing Directions,' 8th edition, vol. ii. p. 580, and 'Physical Geography of the Sea,' London, 1860, p. 478.

† Neumayer, 'Meteorological and Nautical Observations,' Melbourne, 1864 (a splendid volume, published by the Government of Victoria, of the highest importance to navigation and physical geography), p. 339.

Baffin Bay is more free of ice and more navigable than the southern end of Davis Strait—upwards of 1000 miles further to the south.

The distribution of ice over the Arctic and Antarctic Seas depends, indeed, upon this one feature of the annual summer debacles freeing the central Polar regions of the ice formed and accumulated during each winter. This floating pack-ice, which vessels meet at both ends of our globe in lower latitudes during the summer, reminds one of a parallel instance in the hydrography of rivers, many of them forming bars at their mouths, rendering navigation difficult and dangerous, whereas beyond these bars the rivers are often navigable to a great extent higher up.

The Antarctic voyages also strikingly show what may be accomplished in the way of exploration by vessels as compared to sledge-parties. It has been calculated that the extent of sledge explorations accomplished in the search for Franklin amounts to 40,000 miles ; but these expeditions were very numerous indeed, whereas the tracks of Sir James C. Ross alone, during only three summer seasons, in the seas within the limit of drift-ice amount to at least 41,500 miles.* His tracks within the space along Victoria Land alone, south of 70° s. lat., have an extent of 4500 miles, and were accomplished in 10 weeks ; this space, traversed again and again by him, pretty well covers all that has been achieved by the numerous sledge expeditions of the Franklin search west of Lancaster Sound. It was observed in the President's Address to the Royal Geographical Society, on presenting the Gold Medal to Sir James C. Ross :— “The greatest geographical discovery of modern times [namely, of Victoria Land, with its immense volcanoes] was thus made within one short month ;” and “it is with unmixed satisfaction also that I have further to state that this arduous service has been accomplished without the occurrence of any casualty, calamity, or disease of any kind ;” † and yet, it must be borne in mind, all this without the aid of steam.

A sledge-expedition, starting from Smith Sound, would at the best be only able to follow the sinuosities of some small intricate channels like those to the south-west ; whereas a vessel from the Spitzbergen Sea would have access to the whole Polar area as far as the sea extends. An expedition like that of Sir James C. Ross would open to our knowledge the whole central area from Spitzbergen to Behring Strait, and from the Siberian coast to the Western, the American boundary of the Arctic basin. The very nature of

* As computed from the charts in his work, the principal one being on so small a scale, that the correct extent of the tracks, if shown and computed on a map of sufficiently large scale, would amount probably to 50,000 miles.

† ‘Journal of the Royal Geographical Society,’ vol. ii., pp. xv. xvi.

sledge-travelling is of a limited kind ; and in the same time, and with the same means of the proposed sledge-expedition, steam-vessels would probably reach the North Pole, and also the South Pole.

Although the geographical and scientific world would be contented to see an expedition sent out for the sake of science alone, nevertheless the interests of the whale-fisheries in the Polar regions are also of great importance ; and I only recall to memory the fact, that the American whale-fisheries in Behring Strait amounted, in two years, to the enormous value of 8,000,000 dollars.

In submitting the foregoing remarks and statement of facts to the attention and consideration of British geographers, my only desire is to see a new English expedition towards the North Pole, attended with more success than the previous ones of Sir Edward Parry, Kane and Hayes, Wrangell and Anjou. If, simultaneously with the attempt of an ice-journey, one or two screw-steamers were to proceed by way of the Spitzbergen Sea, the very cause of failure in the former—namely, the existence of open water—would hold out success to the latter, and so *vice versa*. By having a dépôt of coals at Hammerfest, in lat. 70° N., in order to fill up any that might be consumed on the voyage from England, the expedition would be in a position to enter the Polar Seas under the most favourable circumstances.

An efficient screw-vessel might, in the proper season of the year, accomplish a voyage from the River Thames to the North Pole and back—or to any land beyond the North Pole trending in the direction of Behring Strait, the Siberian or American coast-lines—in two or three months, and at a cost perfectly insignificant as compared with that of any other Arctic expedition hitherto despatched through Baffin Bay.*

At all events, I trust, Sir, that you and the geographers of England will not let the matter drop, and that the English Government will send an expedition forth in whatever way it may be decided on. It would be a small matter for England, the only country in the world whence such an expedition could go forth under good auspices—having the largest experience, the best men, vessels, outfit, and resources for such a service. When, some twenty-five years ago, the great French and American expeditions, under Capt. d'Urville and Lieut. Wilkes, were out in the Antarctic Seas, together with Sir J. C. Ross, it was clearly seen that only the English were

* An expedition like this would be exposed to less risk than any Arctic or Antarctic expedition as yet sent out, by having in the harbours of Spitzbergen, in lat. 80° N., a fixed base for constant communication with England, attainable all the year round from the Thames by a fortnight's sail ; the North Pole, from the said ports in lat. 80° N., being only at a few days' distance by screw-vessels.—A. P., March 10, 1865.

quite at home in the Polar element ; they fearlessly went on with their important explorations for three consecutive years, whereas the other squadrons were always beaten back in their attempts to penetrate towards the South Pole, after a comparatively short time. And surely, where the wealth of the nation is so largely indebted to geographical discovery and knowledge as is the case with England, some little return ought to be made to science.

To be sure, there are at every new undertaking by which the world and human knowledge is to make another step in advance some who endeavour to deprecate it, because they cannot see any immediate profit in pounds, shillings, and pence to spring out of it — persons who laughed at the idea of a railway or a steamboat, and for whom we should have had neither railway nor steamboat, nor the discovery of America, or the development and gold-fields of Australia, &c. &c. But I assure you, Sir, to us people here, out of England, the greatness of your nation and countrymen stands forth quite as much in their systematic exploration of the glacier regions of the Alps, their scientific balloon ascents, their survey of Jerusalem, their determination of the level of the Dead Sea (for which object I rejoice to see your Society has liberally voted the sum of 100*l.*), their fathoming the depth of the sea, in their Polar expeditions, &c. &c., as in anything else.

AUGUSTUS PETERMANN.

Gotha, 9th February, 1865.

Captain SHERARD OSBORN said he did not wish to oppose Dr. Petermann's theory of an open sea round the Pole, for he believed Captain Maury, one of the greatest hydrographers of the age, shared the same opinion. This supposition might be the right one ; but, as a sailor, he questioned whether it would be possible to reach the open water except at a season of the year when all navigation is at an end. He did not believe, however, that the whole of the 1,131,000 square miles round the Pole were occupied by water, and he advocated the proposed expedition in order that the question might be set at rest. He thought the route by Smith Sound preferable to that by Spitzbergen, as it afforded a basis and means of constant communication and of a safe retreat. The fears of the public as to the safe return of such an expedition would have but little ground were his plan adopted. The question of a Polar sea was only part of the broader and larger question of maritime discovery and exploration. The naval profession had been in a state of peace for ten years, and he was anxious that the young and energetic men of the navy should have an opportunity given them to win their promotion ; and in doing so, in this instance, they would at the same time advance the interests of science. It was the duty of the Geographical Society to urge on the Government in that direction. There would certainly be no lack of volunteers for such an expedition, and he believed one English admiral was ready to take a squadron by Spitzbergen to the North Pole. McClintock and Allen Young, were prepared to go at once either by Smith Sound or by any other route ; and he himself, although now under other engagements, would be ready to undertake the matter should

there be no abler man to do it. He had been told he must point out where the funds were to come from, but with that he had nothing to do. The nation gave 10,000,000*l.* a year to the navy, and during the last ten years had spent 150,000,000*l.* on it, although the fighting ships which they possessed might be counted on the tips of the fingers. Of this large sum only half a million had gone to the scientific departments of the profession, and was he unreasonable in asking that more money should be spent in that direction?

Professor OWEN said pure zoological science had little to expect in comparison with the general scientific results that we might hope to derive from the proposed exploration. The most valuable part of natural knowledge is certainly derived from the direct observation of Nature; and was it to be supposed that so long as any portion of the earth's surface remained to be observed, that those who are intent upon the acquisition of pure truth would for ever be patient and silent so long as that piece of observation was not carried out? Never! What was there in the history of the successive expeditions to the Arctic regions to deter us from prosecuting further explorations? Every expedition during the last forty-five years had brought us additions of knowledge. Unhappily, one or two had been attended with fatal results, and the unfortunate loss of Franklin had given a check to further research in that particular direction of the earth's surface. But, as men of science, they ought to keep the main end in view, which was to go on learning more and more of that which yet remained to be known. He trusted as time had gone on the country had got into a more healthy and businesslike frame of mind, and would consider that it was our duty, as the greatest discovering and colonising empire the world ever knew, to resume Arctic exploration, and so complete what still remained to be accomplished. Now, if it were true that there is open water round the Pole, this, to the naturalist, would open out hopes of great results for increasing our knowledge of Natural History. Open water implied a prodigality of life in that part of the world. To mention only one curious genus, the Manatee—a warm-blooded animal, allied to the whale tribe, but very different in form, and having something human in its physiognomy and in its habit of swimming with its young clasped to its breast—we might learn a little more about the rarest, and now supposed extinct species, if the open water round the Pole were successfully reached. The small number of these creatures that are known still to live on the earth are found in tropical latitudes. There is one species living in the great rivers of South America, another in those of Tropical Africa, a third in Australia; but in Europe these strange creatures had been found only in a fossil state, in middle tertiary strata. Now, since the time when a Manatee lived in the sea which covered the northern part of the old Europeo-Asiatic continent, the land has become gradually upheaved, and the continent has been spread from south to north, and we heard, in the last century, of a rare and solitary form of these strange animals inhabiting the icy sea of Siberia. This had been named by Russian naturalists the *Rhytina*; no specimens of it existed in England, but casts of the bones had been promised to the British Museum. He thought it within the bounds of probability that the *Rhytina*, or some allied form, might be found in the retired waters of the Pole, and, if such were met with, there was no discovery which would so powerfully interest men of science. It would tend to throw light upon Geology, as well as upon Zoology, if we could get an insight into the kinds of creatures that lived under former conditions of land and sea, and compare them with those that are still living under the present conditions. To come to a higher form of life, there is the probability of getting a further insight into that most interesting of all the varieties of the human race, the Esquimaux, whose migrations had been so admirably and so ably treated of in Mr. Markham's Paper. There must have been many ripples or waves of migration before these poor people were pushed to the northern parts of Asia; and if there had been one wave of that migra-

tion which had turned to the Arctic regions of America, and had kept itself to this time clear from all connexion with other and higher races, let them conceive what a curious revelation this would be. In the relics of that ancient European race who found their dwellings ready made in the caverns in the south of France, and whose implements were framed from the hardest stone, were indicated a similarity of life and condition of people which might be found to continue to exist in a remote wave of Asiatic human life, driven into these extreme northern latitudes. Therefore, in the name of Zoology, he would strongly urge that we should go on with the proposed exploration, and completely solve the yet unsolved problem of the condition of the northernmost part of our globe.

Captain MAURY would mention only one of the facts which led him to the conclusion that open water must exist in some portions of the Arctic regions every winter. It was known that the *Resolute*, the *Rescue*, and the *Advance*, which were frozen up in the ice, drifted far to the south, and were afterwards melted out. In the spring of the year, when they came to examine the ice in the very latitude in which these vessels were frozen up, it was found to be younger, because thinner, ice than that out of which they had been thawed. That phenomenon could not be explained on any other theory than that the ice had been formed after the ice with which the ships drifted began to move. Again, there was the well-known fact that there is an under-current of comparatively warm water running to the north, while the colder current on the surface is always to the south. There must be a place somewhere in those regions where the water ceases to go forward, rises up, and begins to come out; and at that place there must, he thought, be open water. With regard to the proposed expedition, it appeared to him that Captain Osborn had put a ball in motion which he was sure his countrymen would roll to the North Pole. Arctic expeditions had originated in the hope of discovering a North-West passage to China and Japan for purely commercial reasons; but when hopes of benefit to trade had died away, the English Government continued to encourage them, in order, as he believed, to keep alive the spirit of daring and enterprise which had always characterized the Navy, and at the same time to promote the interests of science. The fears which had been excited by the loss of the Franklin expedition were entitled to consideration and respect; but when we found such men as Osborn, and McClintock, and Inglefield, and Pim, and Allen Young, with others, both officers and men, who had been in those regions and who know what Arctic dangers really are, not only in favour of further exploration there, but ready and willing to go again, he thought this fact ought to quiet the fears of our stay-at-home explorers, and satisfy the public that Her Majesty's Government ought not to be deterred from sending out another expedition on account of any supposed danger. If they looked at the wreck-charts they would see that more lives were lost in sight of our own shores during last year, than had perished during the forty and odd years in all the Arctic expeditions put together. Considering that the Esquimaux have left traces of their migrations almost as far north as our exploring parties have gone, and could find subsistence without guns or bows and arrows in those regions, it would be very remarkable if the British sailor could not, with the appliances of civilization that he would carry with him, follow where the savage man had led. Granting the probability of the existence of an open sea near the Pole, yet we did not know where to find it, or whether we could get into it with a ship or not; therefore, Captain Osborn had proposed an admirable plan when he proposed to send out a couple of ships and make them the centres of land explorations. In fact, he considered the work to be done a small affair, compared with Antarctic exploration; and he hoped, after they had done with the North Pole, they would put the ball in motion towards the South Pole, to which he must confess he had a great leaning.

Lord HOUGHTON said that, having given this question the best consideration

he could, he had come to the conclusion that it was his duty, as Trustee of the Geographical Society, in any public capacity in which he might be placed, to advocate this expedition. He was inclined to believe that Her Majesty's Government would do well to accede to the proposition. He was sure that Sir Roderick would not have encouraged this expedition, did he not believe it was one which combined great practical advantages with due security for the public interests, and for the lives of great and brave men. No doubt a tremendous tragedy had thrown a gloom over the whole of these speculations; but the time would come when such tragedies would pass from the public mind, when we should feel that new efforts were still necessary for this country to make. At the same time, we must expect the Government would not approach the subject in any but the most serious and matured spirit; therefore, he would recommend that the scientific Societies should present themselves before the Government in a clear and distinct manner, specifying exactly the advantages which they believed would accrue from the expedition, and detailing the comparatively little risk that would be incurred. Then, he believed the Government would listen to their proposal.

Mr. LUBBOCK, President of the Ethnological Society, said the question of whether the Esquimaux came from Siberia or not would depend in a measure upon the similarity of their language with that of the Siberian tribes. On this point he would not express any opinion, but, admitting such a migration, he could not entirely agree with Mr. Markham as to the period at which it had taken place. Mr. Markham had endeavoured to connect the supposed emigration with the great Mongol uprising in Central Asia about the time of Genghis Khan. That event occurred in the twelfth century, and it was nearly 150 years before this that the Esquimaux were discovered on the coast of Labrador. This alone would prevent him acceding without hesitation to the theory which Mr. Markham had brought before them. Archæological investigations would perhaps show that just as the Laplanders, who at one time extended over a great part of Europe, were gradually driven into the north by the superior force and strength of the Celt and the Teuton, so in North America the Esquimaux extended further south, and were driven to the north by the superior power of the Red Indian. With regard to the assertion that Greenland was uninhabited at the time it was discovered by the Northmen, that in fact the Norwegians and not the Esquimaux were the aborigines of Greenland, he should like to hear more of the evidence upon which it rests. Again, he could not understand how these Northmen could have been destroyed by these miserable Skrellings—these poor little Esquimaux, when, according to Mr. Markham, for many years they had been dragging on a precarious existence on the inhospitable shores of the north, harassed by suffering, and weakened by a continuous state of semi-starvation. On these points he thought that fresh evidence would be required before we could entirely adopt the views advocated by Mr. Markham in his able and interesting paper. He would only add that he agreed with Mr. Markham that Dr. Kane was premature in the opinion that the Arctic Highlanders were rapidly dying out. He hoped, on the contrary, that they would for a long time continue to reproduce in this nineteenth century the manners and customs and mode of life of our ancestors in pre-historic times.

Mr. CRAWFORD said he did not believe in the alleged migration of the Northmen in the ninth century and settlement on the coast of Greenland. No doubt the northern pirates did occasionally visit the country and leave their marks upon it. The existence of a colony of three hundred villages of men of a Teutonic race, in a region where no cereal would ripen, and its sudden disappearance, appeared to him utterly incredible.

Lord STRANGFORD asked how Mr. Crawfurd accounted for the Runic inscriptions?

Mr. CRAWFORD said the pirates took them there.

Mr. MARKHAM asked how he accounted for the church bells?

Mr. CRAWFURD replied, the pirates might have been good Christians. He had no doubt the Esquimaux were there from time immemorial, inhabiting the country from Behring Strait down to Cape Farewell. He was also satisfied that they were not of Asiatic origin.

Mr. HAMILTON, President of the Geological Society, said there could be no doubt that to every person connected with the study of geology it would be a matter of great interest to see these northern regions geologically explored. As it is, we already know that there are many interesting circumstances connected with the geological structure of that portion of the globe. We know that to a great extent the rocks consist of very old formations, coinciding with those which have been observed in other portions of the globe, the flora and fauna of which indicate a much warmer climate than anything we are acquainted with in our latitudes: consequently there was every reason to suppose that at some distant geological period the conditions of heat and climate which regulate the existence of animal and vegetable life upon the surface of the globe must have been different from those that prevail at present. If this were a curious and important question with regard to the latitudes in which we live, it became still more curious and important when we approached regions nearer to the Pole. Therefore, he trusted that should this expedition go forth, a competent geologist would be attached to it. In conclusion, Mr. Hamilton expressed his opinion that unless a very strong pressure were put upon the Government they would not meet with the assistance they felt they had a right to expect.

Mr. MARKHAM, in reply to Mr. Lubbock and Mr. Crawford, said he was still of opinion that the Esquimaux were of Asiatic origin. To the question, how did they destroy the Northmen, he could only reply that it rested on history as authentic as the records of our own country before the Conquest. Mr. Crawford had suggested that the Northmen merely visited the coast as pirates and did not settle there. All along the coast we found extensive ruins: churches, that might almost be called cathedrals, in two places, and the remains of very large church bells. There must have been large settlements, but how they had been destroyed we could not tell. If the Esquimaux did not destroy them, we did not know who did, and we knew that the Greenlanders came from the north. He denied that the language was of American origin; it was the same as the language of the tribes of Northern Siberia. Still there might be erroneous views entertained on both sides, and it only showed how necessary it was that another expedition should be sent, in order that this and other questions might be solved.

The PRESIDENT, in concluding the discussion, assured the President of the Geological Society that he need not despair of the pressure that would be put upon the Government by the scientific Societies of the metropolis. They would have a long pull and a strong pull and a pull all together, and he was convinced they would carry their object.

Eighth Meeting, 13th March, 1865.

SIR RODERICK I. MURCHISON, K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Henry B. Owen, Esq. ; Major A. Y. Sinclair ; Rev. Thomas Fleming ; Alderman J. S. Gibbons ; Francisco E. Pereira, Esq. ; Gilbert Mackmurdo, Esq.*

ELECTIONS.—*Colonel Henry W. Blake ; Rev. T. Cornthwaite, M.A. ; Captain Roderick Dew, C.B., R.A. ; Hereford Brooke George, Esq. ; Lord William Hay ; Thomas Morson, Jun., Esq., F.C.S. ; Edward B. Phillips, Esq. ; Sidney Bouvier Pusey, Esq. ; W. J. Rideout, Esq. ; Alphonsus Webster, Esq.*

ACCESSIONS TO THE LIBRARY.—Continuations of 'Journals,' 'Transactions,' &c., of the different Societies.

ACCESSIONS TO THE MAP-ROOM.—Ordnance Maps—Parish of Northwood, Isle of Wight ; Area Books of the Isle of Wight. Tasmania—West, nach Charles Gould, M.A. ; by A. Petermann. South America—Peru, by M. Manuel Ronand y Paz Soldan ; by the Author. Asia—Carte de la Terre Sainte, pour servir à l'étude des Saintes Écritures, par C. W. M. Van de Velde ; Karte zur Übersicht der Reisen von G. Rohlfs, in Marokko 1863-4 ; by A. Petermann, Gotha, 1865.

The first Paper was—

1. *On Stereoscopic Maps, taken from Models of Mountainous Countries.*
By FRANCIS GALTON, ESQ., F.R.S., F.R.G.S. Illustrated by Photographs taken by R. CAMERON GALTON, ESQ.

THIS was a description of a new application of photography to the delineation of mountainous districts, for the use of tourists. The best maps, it was maintained, failed to impart a correct idea of the inequalities of mountainous regions. Simple shading is too feeble an instrument to express gradations of relief, and contour maps fail wherever crags and cliffs have to be represented, for the lines then become so superimposed that they are wholly unintelligible. Having often had disagreeable experience of the inadequacy of maps in these respects, Mr. Galton conceived the idea of testing the effect of stereographs, and borrowed a few of the smaller and less delicate models for the purpose, from the collection of the Royal Geographical Society, placing them in the hands of his cousin, Mr. R. Cameron Galton, an excellent amateur photographer, who had kindly offered to assist him. It was found that by taking stereoscopic views of good models (coated temporarily with white paint whenever the tints were unsuitable for pho-